



CAUTION - AVALANCHES!

Edited by:

Swiss Federal Institute for Snow and Avalanche
Research, Davos (SLF)
Swiss Federal Office for Sport Magglingen (BASPO)
Friends of Nature Switzerland (FNS)
Swiss Alpine Club (SAC)
Swiss Army (C3I Brigade 34, gr aval 1, CMCI)
Association of Swiss Mountain Guides (ASMG)
Swiss Air Rescue (Rega)
Swiss Ski Association (Swiss Ski)

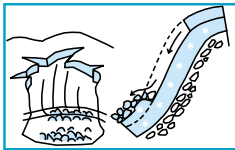
With support of:

MeteoSwiss
Swiss Association of the Mountaineering
Schools (SAMS)
Swiss Council for Accident Prevention bfu
Swiss Interassociation for Skiing (SIAS)
Swiss Commission for the Prevention of Accidents
on Ski Runs (SKUS)
Swiss Ski School Association (SSSA)
Swiss Snowboard Association of Instruction
and Training (SSBS)
Swiss Foundation for Alpine Research (SFAR)
Swiss Snowboard Association (SSBA)
Swiss cableways

To be obtained at: the Editors
Third edition: 2000

Avalanche Formation

Types of avalanches (dry or wet snow)



Slab avalanche
(most dangerous for the winter recreationist)



Loose snow
avalanche

Precondition

minimal slope angle: 30° for dry snow slab avalanches
25° for wet snow avalanches
(steepest part of start zone)

Pay attention to runout zone!

An increase in stress (for example by a skier) or a decrease in strength can cause the release of avalanches (spontaneously or artificially).

When does the danger of avalanches prevail:

- *New snow combined with wind*
- *Rapidly and distinctly rising temperatures*
- *Weak layer within the snow cover*

Slab avalanches are also possible when there appears to be superficially loose packed powder snow.

The **first sunny day** after a snowfall period is particularly dangerous.

Wet snow avalanches

In spring by gradual soaking the snow cover loses its strength:

➡ **Increasing danger of wet snow avalanches!**

If the snow surface is distinctly refrozen, following a clear night, mostly favourable conditions prevail before midday. But, pay attention after midday and generally anytime, when the sky is overcast:

➡ **Pay attention to daily evolution!**

Assessing the Avalanche Hazard

1. Planning the Trip at Home

Conditions

Avalanche bulletin:

Weather forecast:

Additional information:

Weather and Snow

Snow cover condition, region and degree of danger, bordering regions, tendency.
Precipitation, air temperature (level of zero degrees or snowfall level), visibility and wind, short- and medium-term development. Phone numbers:
Weather report (general): 162
Weather report for the Alps: 0900 552 138
Individual information: 0900 162 333
From keeper of the cabin, safety and rescue services, confidant person.

Terrain

Maps and guide books:
(plus personal knowledge of the terrain)

Map 1: 25 000; ski touring map (take note of the back), ski touring guide books.
Mark the route on the map, analyze the danger zones and the key positions, measure the steepness. Plan possibilities for turning back, variants, alternative routes or trips.
Gather information from people familiar with the area.
If possible reconnoitre.

Realistic time-schedule

Human factors

Who will participate?
Size of the group, technique, shape, discipline.
What will each person take along? Is the equipment in order?
Who is responsible?

Recent accumulations of wind-driven snow are often particularly dangerous.

2.

2. Assessing the Local Avalanche Danger

Conditions

Weather and Snow

The weather can rapidly change the avalanche situation.

<i>Precipitation:</i>	Snow, rain, intensity.
<i>Wind:</i>	Speed, direction (high-altitude wind, local wind).
<i>Temperature:</i>	Current temperature, previous and expected development.
<i>Visibility:</i>	Prerequisite for the selection of a good route.
<i>Clouds:</i>	Prevent distinct cooling of the snow surface.

Critical new snow depth:

➡ **at least *considerable* danger**

- 10–20 cm when conditions are bad
- 20–30 cm when conditions are fair
- 30–50 cm when conditions are good

The conditions are assessed according to the following criteria: wind speed, temperature, quality of old snow surface, frequency and regularity with which the slope is skied.

Alarm signals

➡ **at least *considerable* danger**

Recent natural slab avalanches and remote triggering on similar slopes.
Rumbling noises ("whoomphs") and shooting cracks.

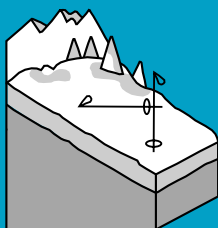
General snow conditions, snow cover

A thick snow cover is generally more stable than a thin snow cover.
Danger assessment may be supplemented by field tests (e.g. shovel shear test, rutschblock test) to gain additional useful information (weak layers?).

Terrain

Control and correct the trip planing.

<i>Steepness:</i>	Estimate and measure the steepness (critical steepness: 30 degrees), also consider steep slopes above and below the route.
<i>Aspect:</i>	Most accidents happen on steep, shady slopes near the crest.
<i>Relief:</i>	Hilly ground is more likely to allow for the selection of a good route.
<i>Vegetation:</i>	Sparse woods do not protect from slab avalanches.



$\frac{1}{2}$ ski pole length = 27°
 $\frac{2}{3}$ ski pole length = 35°
whole ski pole length = 45°

Human factors

Who belongs to my group?

Check of equipment and transceivers.
Is any other group travelling in the terrain?
Frequently check the physical condition of the group and the time-schedule.

New Snow + Wind = Danger of Slab Avalanches!

3. Assessing Specific Slopes

- Goal:**
- ➡ best route selection
 - ➡ safety measures (e.g. intervals, corridor, follow tracks)
 - ➡ by-passing or turning back

What's above?
What's below?

Conditions

Weather and Snow

- Critical depth of new snow.
- Snow quality.
- Recent accumulations of wind-driven snow.
- Radiation, temperature.
- Visibility.

Terrain

- Steepness, shape, location (e.g. near to crest) and size of the slope.
- Altitude and aspect.
- Danger of fall.
- Danger of getting buried (terrain trap).
- Alternatives.

Human factors

- Physical and psychical condition.
- Discipline.
- Size of group.

All informations and observations from:

- Trip planing (p. 3)
- Assessing the local avalanche danger (p. 4–5)
- Assessing specifics slopes (p. 6)

➡ should be considered to decide
whether and how to go.

Risk assessment



Avalanche Bulletin

The degree of avalanche danger depends on: the release probability (the natural stability of the snow cover and the effects of human activities), the distribution and frequency of dangerous slopes, the size and type of avalanches, and the thickness of the sliding snow layers.

National bulletin

Structure: General situation, short-term development, forecast of avalanche danger for the following day (degrees of danger, incl. aspect and altitude of the dangerous slopes), tendency for the subsequent days.

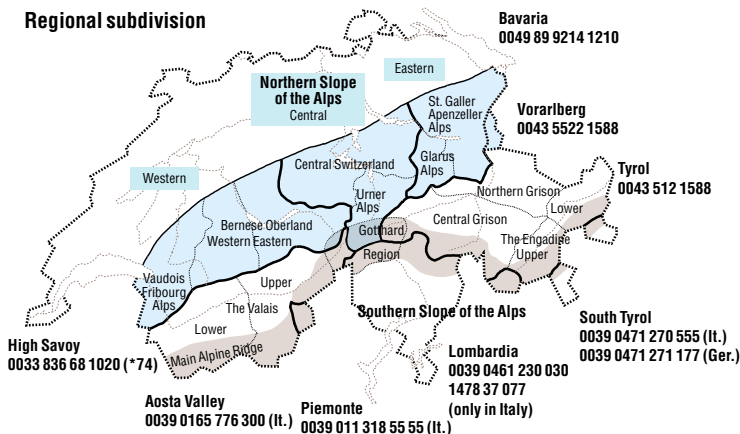
Content: Information about snow conditions, and regional avalanche danger for all regions of the Swiss Alps (regional indication, local divergence is possible, transitions are smooth!).

Issue and distribution: Daily after 5 p.m. Phone: 187, Fax: 0900 59 20 21 (in German), 0900 59 20 22 (in French), and with a lot of additional information on the web: <http://www.slf.ch>

Regional Bulletins

For a few regions, daily after 8 a.m., a regional bulletin in graphical form is issued. Call the fax no. 0900 59 20 20.

Regional subdivision



Avalanche Danger Scale (abbreviated)

Degree of danger	Avalanche release probability and local distribution of dangerous slopes. Consequences for persons in uncontrolled areas. Recommendations.
1 low	Triggering is generally possible only with high additional loads (e.g. groups without intervals) and on few very steep, extreme slopes. Only a few small natural avalanches (sluffs) possible. Generally safe conditions.
2 moderate	Triggering possible in particular with high additional loads, particularly on the steep slopes indicated in the bulletin. Large natural avalanches not likely. Favourable conditions, for the most part. Routes should be selected with care, in particular on steep slopes of the aspect and altitude indicated in the bulletin.
3 considerable	Triggering possible even with low additional loads (e.g. single person), particularly on the steep slopes indicated in the bulletin. In some conditions, medium and occasionally large natural avalanches may occur. Partly unfavourable conditions. Experience in avalanche hazard assessment required. Avoid steep slopes of the aspect and altitude indicated in the bulletin if possible.
4 high	Triggering probable even with low additional loads on many steep slopes. In some conditions, many medium and several large natural avalanches are likely. Unfavourable conditions. Great experience in avalanche hazard assessment required. Limitation to moderately steep terrain; take care of runout zones.
5 very high	Numerous large natural avalanches are likely, even in moderately steep terrain. Very unfavourable conditions. Renunciation recommended.

Points to Remember

Elementary Safety Measures

- Gather information on weather, snow and avalanche conditions, trip preparation.
- Inform others about your plan, on intended route.
- Set transceiver (rescue beacon) always to TRANSMIT (check functioning), carry an avalanche shovel, and possibly an avalanche probe.
- Constant reassessment of: weather, snow, terrain, human factors, time schedule.
- Circumvent recent accumulations of wind-driven snow.
- Consider the variations in temperature depending on the time of the day / the impact of radiation (path to the cabin).
- Ski down extremely steep slopes one at a time.

Precautionary Measures

It is recommended to avoid the slopes of the aspect and elevation indicated in the avalanche bulletin as particularly avalanche prone, that is

- in the case of "moderate" danger, slopes above 40°.
- in the case of "considerable" danger, slopes above 35°.
- in the case of "high" danger, slopes above 30°.
- On the slopes below 40° (at "moderate" danger) and 35° (at "considerable" danger), and on other dangerous spots indicated in the bulletin, it might be prudent to take precautions.

Additional Precautionary Measures

(particularly in connection with alarm signals: p. 4)

- Avoid the steepest sections of a slope and of gullies.
- Keep a distance from one to the other (when climbing at least 10 m).
- Ski down one at a time, define a descent corridor, ski gently, avoid falls.
- In case of fog or bad visibility in steep, unknown terrain: turn back!

About 90% of all fatal avalanches have been triggered by the victim or by a member of the same party.

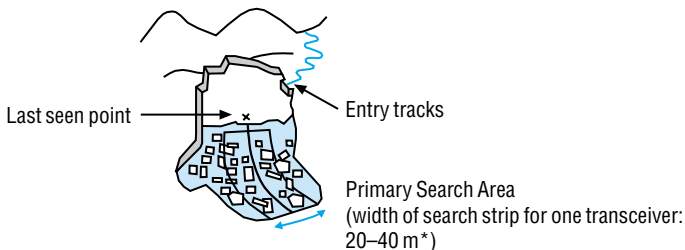
Avalanche Accident – Rescue

Action of the Caught

Try to ski out of the avalanche area (rarely possible); open bindings, let go off ski poles, pull your knees toward your chest, and hold your arms in front of your face.

Fight – keep calm

Action of the Non-Buried

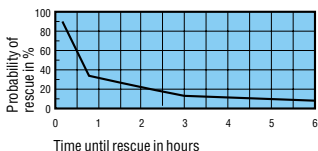


- Watch the avalanche flow and the persons caught (note the last seen point).
- Gain an overview—think—act. Assess your own safety, avoid further accidents.
- Determine primary search area (in the flowing direction below last seen point).
- Begin searching* immediately with transceiver (turn off transceivers that are not in use) and at the same time search with eyes and ears.
- Alert rescue service.

* Width of search strip and search pattern according to transceiver user manual.

If transceivers are not available:

- Search with eyes and ears.
- Alert rescue service.
- Systematic, repeated improvised probing.

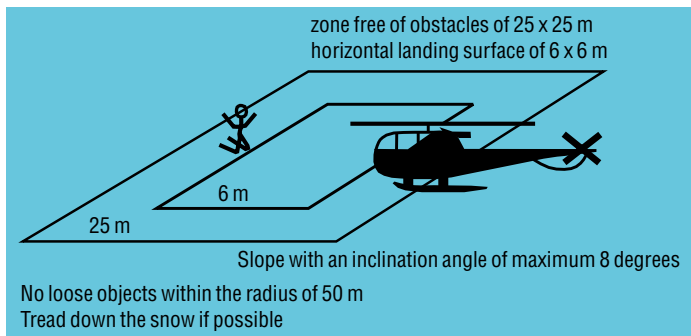


First Aid for Avalanche Victims

- Uncover head and chest as fast as possible, clear the breathing passages, check if there is a breathing cave.
- Start artificial respiration (mouth – to – nose), when the circulation has stopped, start cardiopulmonary resuscitation simultaneously; continue resuscitation until a medical doctor takes over.
- Prevent further cooling.
- Position the victim according to injury.
- Strictly survey and take care of the victim.
- Gentle evacuation with the helicopter.

Air Rescue

Requirements for a helicopter landing place



Guiding

The person guiding the helicopter kneels at the edge of the landing area until the rotor has stopped. Look at the pilot.

Generally

Approach the helicopter not before the rotor has stopped. While the rotor is running, get in and out only in the company of a crew member and always stay in eye contact with the pilot.

Alarm – Accident Report

Swiss Air Rescue: Rega: tel. 1414 or radio: 161.300 MHz (channel E)
(no area code, also with cellular phone)
Police: tel. 117 or radio: 158.625 MHz (channel K)

Concise report = Effective help

Report

Who – Name of the person calling and of the organization
– Phone number or radio name of the caller
– Location of the caller

What happened? _____

Where is the location of the accident? _____

Coordinates _____

When did the accident happen? _____

How many number type of injury

Number of help at the site of the accident? _____

Weather in the area where the accident happened?
Visibility: ☐ below 200 m ☐ up to 1 km ☐ more than 1 km

Helicopter Landing at the site of the accident: ☐ possible ☐ impossible

Remarks _____
